Chem.

# The CHEMIST

DECEMBER, 1938 AMERICAN INSTITUTE OF CHEMISTS VOLUME XV, NO. 9

THE YOUNG CHEMIST AND THE GOVERNMENT SERVICE

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PROPER EDUCATION FOR CHEMISTS

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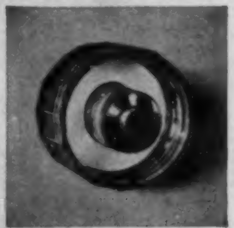

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# The Young Chemist and the Government Service

**By Louis Marshall**

**A chemist in the U. S. Civil Service presents a series of articles dealing with the opportunities for chemists in the Government service.**

I

EVERY student who intends to make chemistry his life work should know that one of the most important fields of employment for the chemist, whatever his specialty, is the Civil Service. The United States Government employs about one thousand men and women who specialize in chemistry. No subdivision of that great science escapes investigation in one or more of the Government laboratories, and the products of the labor of these scientific men and women have enhanced the standard of living of our nation; provided us with wholesome, unadulterated foods; raised the standard of the public health; improved the quality of the clothes we wear and of the innumerable articles we buy; safeguarded the water we drink; and in certain industrial sections of our country, cleansed the very air we breathe. The researches of Government chemists have led to the establishment of new industries and the strengthening of the old. Our nation's huge investment in science has drawn and is drawing its full dividends in the betterment of the welfare of its inhabitants.

The Civil Service Commission of the United States has sought to interest chemists in Government Service. It is a career service. The young chemist with a college degree, after passing a competitive examination and receiving appointment, enters as a Junior Chemist. The salary range of this position is $2000 to $2500 per annum. He can rise successively through the ranks to the position of Assistant Chemist with a salary range of $2600 to $3100; Associate Chemist, $3200 to $3700; Chemist, $3800 to $4400; Senior Chemist, $4600 to $5200; Principal Chemist, $5600 to $6400; and Head Chemist, $6500 to $7500. It may be said, however, that in the last six years or so, promotions have not been frequent. The few head chemists in the Government service are all outstanding in their profession. The one in the Public Health Service, for instance, is a Willard Gibbs medalist; the one in

the Navy Department is an associate editor of *International Critical Tables.*

Until 1931, examinations for the position of Junior Chemist were held each year for students who majored in chemistry. Some interesting figures concerning examinations for Junior Chemist are included in the following table:

| Year ending June 30th of | Number Examined Male | Number Examined Female | Number Passed Male | Number Passed Female | Number Appointed Male | Number Appointed Female |
|---|---|---|---|---|---|---|
| 1924 | 104 | 18 | 54 | 2 | 20 | 0 |
| 1925 | 193 | 38 | 87 | 11 | 30 | 0 |
| 1926 | 269 | 31 | 133 | 5 | 35 | 1 |
| 1927 | 224 | 45 | 120 | 17 | 48 | 3 |
| 1928 | 261 | 32 | 106 | 8 | 54 | 3 |
| 1929 | 357 | 58 | 201 | 24 | 70 | 3 |
| 1930 | 425 | 69 | 151 | 15 | 69 | 3 |
| 1931 | 1030 | 143 | 462 | 63 | 44 | 1 |

In the interval from 1931 to 1935, the eligible lists of chemists were so ample, and appointments so few, that the Civil Service Commission did not deem it desirable to hold further Junior Chemist examinations. In 1936, however, an examination was held. It attracted 2602 men, of whom 992 passed, and 216 women, of whom 66 passed.

A study of the above figures permits certain conclusions. During the years before the business depression, the number of candidates taking the Junior Chemist examination, while varying considerably, averaged but 243 per year for the period from 1924 to 1928 inclusive. During the depression, however, the number of candidates presenting themselves for examination increased by leaps and bounds, the average for the years 1929 through 1931 inclusive and the year 1936 being 1225. This quickening of interest in civil service positions during periods of depressed industrial activities is very characteristic. In this connection, it can be pointed out that in 1925 the examination for the position of Assistant Chemist, which is one grade higher than Junior Chemist, was taken by 55 candidates. Ten years later, in 1935, the Assistant Chemist examination attracted 1836 candidates.

During the period covered by the above figures, there appears to be no significant variation regarding the proportion of candidates to pass the examination. The poorest showing was, in the case of men, in 1930, when 36 per cent passed; and in the case of women, in 1924, when 11 per cent passed. In 1925, the proportion of men to pass reached its highest of 56 per cent; and in 1931 the proportion for women reached its highest of 44 per cent. In each year the percentage of failures was greater among women than among men, but an attempt to generalize

as a result of this observation would be dangerous for more reasons than one. Considering again the entire period covered by the figures, one finds that of those men who passed the examinations, 51 per cent received appointments in 1928 as against 9.5 per cent in 1931. The corresponding percentages for women are 38 per cent in 1928 and 0 per cent in 1924 and 1925. Thus in the period from 1924 to 1931 inclusive, a total of 2863 men presented themselves for examination and of this number 1314 passed and 370 received appointments. The corresponding figures for women are 434 who took the test, 145 who passed, and 14 who received appointments.

As stated before, the policy of the Civil Service Commission of giving a Junior Chemist examination was resumed in 1936 after a lapse of four years. In April of 1938, the Commission announced a series of examinations for various grades of Chemist ranging from Junior to Senior. Complete figures regarding these latest examinations are not available, but they are known to have attracted several thousand candidates. And with the apparent betterment of our economic life, the custom of giving the examination each year may be resumed. The Junior Chemist examination is a written one and consists of two parts. The first part, in general chemistry and elementary physics, is required of all candidates. For the second part, the student may elect to take one, or if he chooses, two of the following subjects: organic, advanced inorganic, physical, analytical, or physiological chemistry. Separate lists of eligibles are made up from each of these examinations. By this method, the young chemist is more likely to receive an appointment in the field of chemistry in which he has shown a preference. The observer of civil service matters cannot fail to be impressed with the utter impartiality of the whole proceeding. The candidate is warned in his application form to avoid reference to religion, politics, or fraternal orders. The examiner who rates the candidate's paper knows him only by number.

The Commission makes every effort to give nation-wide publicity to announcements of examinations. Notices are sent to heads of departments of chemistry in colleges and universities throughout the country. Local offices of the Commission post announcements of examinations on their bulletin boards. Many newspapers print notices of civil service examinations. In addition, if a person feels there is still a chance of his not being notified, he can write to the United States Civil Service Commission, Washington, D. C., requesting that

his name be kept on file to be informed of the next examination in the field of chemistry.

A feature of the Junior Chemist test is that applications are accepted from students who are in their senior year at college and who are majoring in chemistry. They are permitted to take the examination, and may receive provisional appointments; but they may not enter upon duty until they have received their college degrees.

When a vacancy for the position of Junior Chemist occurs, the Commission submits to the appointing officer of the department in which the vacancy exists the records of the three persons who, at the time, stand at the head of the list. The appointment is generally made from among these three. In requesting the three names from the Commission, the appointing officer has the legal right to specify the sex desired.

### The Work of the Junior Chemist

The writer received his appointment from the eligible list in analytical chemistry. The work consists of the analysis of a wide variety of materials to determine their compliance with the specification requirements under which they are bought. For instance, the type of spaghetti which is purchased by the Navy Department must have an ash content of not more than 0.65 per cent; moisture of not more than 12 per cent; and protein of at least 11 per cent. Baking powder has definite requirements for aluminum, phosphorus, and available carbon dioxide. The imitation vanilla flavor purchased by the Navy must contain at least 0.1 gram of coumarin, 0.6 gram of vanillin, and 35 cc of glycerol per 100 cc of the product. Vegetable shortening should have an iodine number of less than 75. Canned sausage may contain not more than four times as much moisture as protein. Crude fiber in cocoa must not be over 7 per cent calculated on a fat and moisture free basis. Gold lace must contain not less than 2 per cent gold and 90 per cent silver. Silk neckerchiefs must not be too heavily weighted. Cotton fabrics must be free from artificial sizing such as starch. Wool-cotton mixtures must contain a definite percentage of wool. Tableware must contain at least 18 per cent nickel. The acid number of white floating soap must not be less than 212. Bond paper of a certain type must consist of not less than 25 per cent rag fibers, with the remainder free from unbleached or ground wood pulp. Its ash must not exceed 5 per cent, nor its rosin 1.5 per cent. The pH for white bond paper must not be less than 4.7 and for colored bond paper not less than 4.2, and so on.

The work is thus seen to be of a rather strict analytical nature, although there is plenty of room for ingenuity and research ability as applied to the improvement of methods of analysis. The preparation of accurately standardized solutions of acid, alkali, silver nitrate, ammonium thiocyanate, sodium thiosulphate, etc., is of course, a necessary part of the procedure. If the quantity of this work is insufficient to keep a chemist occupied for eight hours of each working day, there is usually other work of a very routine nature to do. For example, representative samples of cotton fabrics, purchased in immense quantities by the Government, are sent to the laboratory to determine their shrinkage. These samples are marked off with twenty inch lines in both the warp and filling directions, and they are then placed in a regular laundry machine in which they undergo a standard laundry procedure. The samples are then removed from the machine, centrifuged, and dried thoroughly by means of a current of air from an electric fan. They are then ironed, and the lengths of the lines redetermined. Some types of cotton fabrics are permitted a shrinkage in laundering of not more than one per cent in either warp or filling direction. In other words, if the original twenty inch lines measured, after the laundry procedure, 19¾ inches, a shrinkage 1.25 per cent is indicated and the material is not acceptable. Many cotton fabrics, however, have been so treated in the manufacturing process that they show a negligible shrinkage after laundering.

**National Bureau of Standards — Research Activity**

The first appointment which the Junior Chemist receives is likely to play an important rôle in his career. Transfers are rather difficult to obtain, and many a chemist has reached the retirement age in the laboratory where, as a young man, he first began his work. Thus if the first appointment is to a research laboratory located in a city where opportunities for graduate study are available, the young chemist can well develop into a recognized specialist in his particular field. Indeed there are many instances of chemists whose achievements in Government laboratories have won for them the respect and the praise of their fellows in the profession.

Most of the research laboratories, though by no means all of them, are located in Washington, D. C. This city is very favorably situated from an educational standpoint. Its library facilities are unexcelled. The local universities conduct special late afternoon and evening courses for Government workers, and it is entirely possible for a young man to win his Ph.D. degree by attending these classes after working

hours. Although possible, however, it is an achievement of great difficulty; a task not to be essayed by those timid souls who would let " 'I dare not' wait upon 'I would'." Some government laboratories, such as the National Bureau of Standards, which is part of the Department of Commerce, give courses to their younger scientific workers which are accepted by several universities as leading toward higher degrees.

This National Bureau of Standards, established by Act of Congress in 1901, has, in the thirty-odd years of its existence, earned an international reputation for the precision and elegance of its research work. It is perhaps not as generally known that this institution also does an enormous amount of routine testing to determine the compliance with specification requirements of a wide variety of products purchased by the different Government Departments. The Bureau of Standards can therefore be described as a national research, consulting, and testing laboratory in the fields of chemistry, physics, and engineering. It is located in the suburbs of Washington. Occupying about nineteen major and minor buildings on a fifty-six acre plot of land, the institution can easily be taken for a university.

Its chemistry division was divided into seven sections until recently, when an eighth, dealing with research in physical chemistry, was added. The other sections deal with paints, varnishes, and other organic protective coatings; detergents, cement, and corrosion; miscellaneous organic materials; inorganic analysis and standard samples; electrochemistry; gas chemistry; and platinum metals and reagents.

The Paint, Varnishes, and Bituminous Materials Section is engaged in research work on these products. Much original work is carried out with a view toward establishing definite specifications under which these items may be safely bought. In addition to its research functions, the section performs analyses on representative samples of paints and varnishes purchased by different Government agencies. The purpose of these analyses is to determine whether or not the products comply with the specifications under which they are bought. About seven thousand samples of paints and varnishes were thus tested in one year.

The section dealing with detergents, cements, and corrosion does research work and performs chemical analyses upon detergents of all kinds, polishes, waxes, non-drying oils, gypsum, clay, cement, lime,

sand, industrial waters, and fire extinguishing compounds. The chemists have coöperated with the American Speciality Manufacturers' Association in drawing up specifications for various soaps, and these have been adopted by the Federal Specifications Board as Government standards. The fire hazards of many products have been studied with a view toward their prevention or mitigation. An indication of the volume and importance of the work can be afforded by a single illustration: In one year, 32,600 samples of cement and concrete, representing purchases of 4,770,000 barrels, were tested. The division recently worked out rapid methods for the determination of silica and sulphuric anhydride in cements.

Under miscellaneous organic materials, are included investigations and chemical analyses of lubricating oils, rubber, paper, textiles, dyes, inks, adhesives, and airplane dopes. This section worked with the research committee of the American Association of Textile Chemists and Colorists to devise standard fastness tests for dyes and dyed textiles. One of the instruments produced as a result of this coöperative effort was the standard fadeometer, by means of which a dyed textile is exposed to the rays of a carbon arc for a definite length of time, say forty-eight hours. The extent of the fading of the dye on the fabric is then observed and compared with a portion of the original specimen. Too much fading is cause for rejection of the textile fabric. Much work has been done on determining the strength and quality of dyes, and the relation of selective absorption to the constitution of dyes, and the effect of solvent and hydrogen ion concentration on the absorption spectra.

The main functions of the section on inorganic analysis and standard samples are to devise refined and routine methods of metal ore analysis; and to develop methods which can be applied to the analysis of the new alloys which are constantly being produced. Another function of the section is the preparation and distribution of the justly famous "Standard Samples" of the Bureau of Standards. These are samples which are certified as to the percentage composition of their constituents, or as to certain physical properties or chemical properties. For example, potassium acid phthalate in exceedingly pure form is sold in laboratories where it is used as a primary standard in alkalimetry. That is, it is used in standardizing a solution of, say, sodium hydroxide to determine its exact normality. Similarly, sodium oxalate is prepared and sold to laboratories where it is used in the standardization of solutions of potassium permanganate. Many steel laboratories

purchase standard samples of plain and alloy steel and use them to check up on their own analyses. Other standard samples are certified as to their fineness, melting point, saccharometric, calorimetric, or thermoelectric value. Standard samples are an important factor in furthering accurate work, and this in turn makes for more uniform and reliable products. They are, therefore, of great value to industry. Interested persons can obtain a complete list of these samples by writing to the National Bureau of Standards, Washington, D. C.

The section on electrochemistry studies the electrodeposition of metals as in electrotyping and electroplating. Experiments are carried out to determine metal distribution in electrodeposition, the structure of electrodeposits, the effects of base metal on the structure of copper map plates, and the problem of nickel deposition. This section furnishes information to business concerns on practical applications of electrochemistry. The research men in the experimental electroplating plant were the first to develop a practical method of producing electroplated coatings of chromium. Since this metal is the hardest one known, its use on gages, printing plates, and other mechanical parts has prolonged their useful life several hundred per cent.

The Gas Chemistry Section devotes its time to devising methods for the purification and analysis of fuel gases and other industrial gases, such as hydrogen, oxygen, chlorine, and ammonia. The important problem of assuring the safety of gas appliances by preventing the formation of the deadly carbon monoxide gas receives attention, and in this work coöperation is maintained with the National Gas Association. This division can be credited with an apparatus for the analytical separation of mixtures of gases by means of fractional distillation.

The section on platinum metals and reagents has done a great deal of work in the field of the platinum metals; their separation, purification, and methods of analysis. This important and costly group of metals, consisting of platinum, iridium, rhodium, palladium, osmium, and ruthenium, has been the subject of the researches of many able investigators all over the world. However, the analytical problems presented by mixtures of these metals have only recently been solved. In 1934, a paper was read at the Ninth International Congress of Pure and Applied Chemistry, held at Madrid, Spain. This paper, which reported the researches of two workers of the Bureau of Standards, dealt with "A New System of Analytical Chemistry for the Platinum Metals". It described a group of reactions which can

be used for the quantitative separation of the six platinum metals from one another, and for their determination. The new system of analysis, for instance, accomplishes the separation of platinum from palladium, rhodium, and iridium by controlled hydrolytic precipitation. When a boiling solution containing sodium bromate and these four metals as chlorides is neutralized to approximately pH 7, the hydrated dioxides of palladium, rhodium, and iridium precipitate quantitatively, leaving platinum in solution. This hydrolytic separation of platinum is superior to the older method of precipitation with ammonium chloride. The detailed procedures involved in this new system of analysis, are described by the authors in Volume 57, page 2565, of the *Journal of the American Chemical Society*.

Other responsibilities of the Section of Platinum Metals and Reagents are: The devising of new methods of analysis for reagent chemicals and the improvement in the quality of chemical glassware and porcelain.

The section dealing with physical chemical research was established in 1926. Its research staff has investigated problems in the field of thermochemistry, as for example, the determination of the heat of combustion of ethylene. Likewise, the calculations have been made of the atomic energies of formation of the gaseous normal aliphatic hydrocarbons. An important function of physical chemistry work at the Bureau is the investigation and improvement of methods of measurement, and the accurate determinations of critical constants. Many papers containing the results of work done in these fields appear in the *Journal of Research of the National Bureau of Standards*, published monthly, and in outside scientific periodicals.

Another organization within the Bureau which is conducting highly important researches, particularly in the chemistry of sugars, is the Polarimetry Section of the Optics Division. One of its functions is the development of methods for preparing these carbohydrates. For example, the research staff of the Polarimetry Section worked out a method for crystallizing corn sugar (dextrose) from water solution thus enabling the production of huge quantities at low cost. This work led to the establishment of an American corn sugar industry which has lately assumed large proportions, producing during the course of the year several hundred thousand tons of the product. Dextrose today finds extensive use in medicine and in the food manufacturing industries. Its production has provided an important outlet for a staple American farm product, corn, of which one

bushel yields approximately one pound of oil, five pounds of molasses, twenty-seven of feed and twenty-six of dextrose. One of the publications reporting the investigations of the Bureau in this field is *Scientific Paper 437* entitled, "The Solubility of Dextrose in Water". It can be obtained at many technical libraries, or can be purchased for five cents from the Superintendent of Documents, Government Printing Office, Washington, D. C. Another publication along the same lines is *Letter Circular 500* of the Bureau of Standards. Similar researches are being conducted with a view to laying the basis for the economical production of levulose, the sweetest of the sugars, from the tuber of the Jerusalem artichoke.

In addition to this practical work on methods of extracting sugar from its source, the Polarimetry Section may be credited with many publications which have added to the world's knowledge of the chemistry of sugars and related products. Some of these publications, as for example, the important series describing the relations between rotatory power and structure in the sugar group have appeared in various numbers of the *Journal of the American Chemical Society* from 1924 to 1930. In volume 48, page 288 of this Journal, there is a paper on the related rotations of amylobiose, amylotriose, and glucose. This paper, like others in the series, is highly technical and can be read with profit only by the specialist. *Letter Circular 507* of the Bureau of Standards lists the publications on polarimetry of members of the staff. It can be obtained free on application to the Bureau.

## Training Industrial Leaders

Training in chemical engineering for young men who aspire to high positions in business and industry was advocated by C. M. A. Stine, vice-president of the E. I. duPont de Nemours and Company. Although the present objective of chemical engineering courses in the universities is to prepare for technical careers in production, research, and engineering, the records of practicing chemical engineers show that ultimately a majority of chemical engineers is engaged in administrative, executive, and other non-technical capacities. The reason—there is hardly an industry which does not depend upon or is importantly related to chemical technology; therefore a knowledge of chemical technology can be very effective in advancing a man to the top positions in industry.

# Proper Education for Chemists

*By* **Fred A. Griffitts, F.A.I.C.**

**A Professor of Chemistry at Maryville College, Maryville, Tennessee, discusses chemical education.**

CHEMICAL education has been a subject of great interest to me for nearly two decades. It was so much so that, while I was still an undergraduate, I subscribed to the *Journal of Chemical Education*. At that time I was merely trying to get some idea of the meaning of the term. Since then I have seen many thoughts and trends pass, like the water under the bridge, only to be lost in the midst of a changing philosophy of education, both in chemistry and elsewhere. If only for one short period of time any very large group of the educators of the country could ever agree on "What constitutes an Education", perhaps the education of chemists would be a bit simpler to discuss. It is impossible to decide what should constitute the curriculum of a chemist unless we know in advance whether the material is really a part of the larger idea of education.

It is also certain that my opinion concerning what a chemist should know in order to be of the greatest service to the profession and society as a whole, will be considered by some as a group of useless words. Having had such thoughts myself about what others have said on the subject from time to time, I have no reason to object to any dissenting ideas as long as they are not malicious.

I first studied chemistry in 1921. The first thing that comes to my mind in that connection is that what was apparently considered the "Education for Chemists" then, was not at all what it is today. I do not know whether anyone can decide which is the more desirable. The fact remains that "it is not what it once was".

To get a starting place from which to discuss the subject it seems necessary to try to state some general objectives and then to see if a means to that end can be found.

Evidently we should educate chemists to meet the needs of the profession and to be beneficent members of the society of which they are a part. The profession consists of three general branches, *viz.*, teaching, consultant, and industrial research chemistry. Among the things that the depression and its concomitant problems taught

us, is the outstanding fact that there is no field of effort or learning worth anything, unless it contributes to the social-economic needs of the people. It is certainly a fallacy for anyone to believe in chemistry only for the sake of chemistry. The economic aspect of chemical products is such that it is impossible not to think of its development in terms of human needs. The code of ethics of the INSTITUTE has impressed me very much with the fact that there should be in the make-up of a chemist strong moral character and a sense of responsibility to the profession and to society as a whole. This should be given great consideration in the training of the chemist. All of this means that there is a recognized factor in the process of educating a chemist, something of the intangible, in addition to that which constitutes the meat of chemical training. I would not suggest for one minute that there should be any decrease in all the fundamentals of a complete chemistry course. I am merely saying that there is something more that must be taught. At the very best the average chemist will have spent at least fifteen or more years in school of one kind or another to be mentally equipped for such a profession. It does not seem logical to expect him to know all the elements of citizenship with little or no instruction. It is barely possible that such instruction belongs to the work of the family, but indications have been that such teaching alone is not sufficient. The above facts can serve as the foundation for the following statements about what the chemist should study and be taught.

In the first place it seems that there is a great need for a rather broad general training in the undergraduate course. There does not seem to be any special need of a student's being rushed through, completing a normal seven or eight years' program for the doctorate in five and a half or six years by carrying extra work and taking summer school courses. It would be far better for such a person to do something during the summer, gainful or otherwise, where there would be ample opportunity to work and play with people and by so doing learn some of the art of living in a society. One reason for the above statement lies in the fact that there is no demand for men in the various fields of employment. There seems to be no great deficiency of available chemists to fill all the normal vacancies. Of course, if there were a pressing need for more men, the hurry-up course might be more justified. In the rare case of a genius the rule might well be abrogated, otherwise not.

As far as the chemistry content of the undergraduate course is concerned, perhaps, in round numbers, about thirty-five to forty-five semester hours properly distributed should be sufficient. The remainder should probably be spent in courses of the liberal arts type. There should be time available in the usual three or four year graduate program for ample specialization and research practice. There does not seem to me to be any necessity for research in the undergraduate studies. At that level is the place for more extensive training in the fundamentals.

## A Suggested Program

If I were called upon to write an undergraduate program for a would-be chemist, it would look something like this:

| | | |
|---|---|---|
| General Chemistry | 8-10 | hours (Semester) |
| Qualitative Analysis | 4 | " |
| Organic | 8-10 | " |
| Quantitative Analysis | 8 | " |
| • Physical | 8 | " |

This totals forty semester hours and might well be augmented to forty-five. This could be done by adding one hour to qualitative and two each to quantitative and physical. But better still the additional hours could be in the form of a course in the history of chemistry—history of chemistry that would teach the use of the chemical library. This should be taught with just as much emphasis on the chemistry of the last twenty-five years as on that of the last two hundred and fifty. By means of assignments of subjects, the use of the journals and current literature would become more familiar. Likewise, a comparison of the writings on some particular subject in various texts and references would give the student information along that line. It has been observed that the acquaintance which many students entering the graduate level have of the books of chemistry is appallingly little. And, try as we may, there isn't an easy way to get Americans to do that sort of reading unless it is on the "credit list".

| | | |
|---|---|---|
| Physics | 10 | hours |
| Mathematics | 15-18 | " |
| French | 12 | " |
| German | 12 | " |

In this connection if the student offered, say twelve hours, in each of the two foreign languages with satisfactory grades from a reputable college, there should not be necessary the ordeal of the language

examination in the graduate school. The full time could much better be spent there on chemistry alone.

English ........................................ 12 hours

This might be divided into one year of composition, half a year of public speaking, and another half of business English and practice in the composition of papers of the type scientific folk are compelled to write from time to time.

Ethics ........................................ 6 hours

This would furnish a place early in the training to incorporate into the minds of the students something of the ideals of the profession like those for which the INSTITUTE stands. Also the student could be led to understand his responsibility as a citizen in addition to that of the chemical profession.

General Sociology ........................................ 6 hours
Economics ........................................ 6 "

The suggested courses to this point total one hundred and thirteen hours. Most colleges require about one hundred and twenty-five for graduation. Many students offer as many as one hundred and thirty or one hundred and thirty-five for graduation. In such a case there would be left at least seventeen hours that would be purely elective. They might select history, Bible, psychology, or literature.

Naturally this program would leave little for elective courses. The listings, from a chemical point of view, are those that represent the minimum that a well trained student should offer as a graduate student. In case of one's intention to work in some of the special fields of chemistry, the elective work should include some of the prerequisites along that line.

After the suggested contents of a course for chemists have been made, there comes the question of what the teacher should put into the course that will go very far toward composing the student's background.

Reference has already been made to the fact that we have witnessed a very great change in what constitutes the subject matter of certain courses in the last two decades. This has been particularly evident in the topics presented in the *Journal of Chemical Education.* With the exception of historical material, it is coming more and more to treat chemistry as though it were physical chemistry. This has also been true in the field of textbooks.

Twenty years ago the general chemistry course was chiefly inorganic, while now it is mostly physical.

This drift has been especially evident in the last few years and, probably, more than anything else, accounts for the great popularity of such recent texts as those by Briscoe and Deming. Far be it from me to say that this is not the right direction of teaching emphasis. It probably is. I offer it only as evidence of the fact that what was once general chemistry is not that now.

A similar shift could probably be found in certain other courses, but I think that too strong an emphasis could not be put on the course in general chemistry. Perhaps it, more than any other, is the most important single one in the chemistry curriculum. I have frequently thought that a strong undergraduate course, with the exception of organic, could be offered using general chemistry each year. In each year different subjects would be stressed and the proper collateral readings required. Speaking of the library reminds me of the fact that as far as I am able to determine the chemistry books are there only to be consulted by the student, if a topic is assigned that cannot be read elsewhere. That may be putting it a bit too strongly, but I venture a guess that a lot of teachers of chemistry could, if they would, make a similar confession. It seems perfectly clear that this is one thing that needs remedying.

After confessing that general chemistry has become "physical" there arises the problem of where the inorganic is to come in. It could be taught as a part of the lecture work of the qualitative and quantitative courses. The remainder of the lecture work of these courses is again "physical". By the time one has had parts of organic taught from the viewpoint of electrons, kinetics, thermochemistry and catalytic influences, and the whole course is topped off with a good solid course in physical, physics, and mathematics, it is evident that the proper training of the chemist is about four years of concerted affort in the field of physical chemistry and related subjects with just sufficient liberal arts subjects to round out a general education.

## New York Chapter Meeting

A meeting of the New York Chapter of The American Institute of Chemists will be held at The Chemists' Club, New York, N. Y., on January thirteenth. A symposium on "Can We Expand Public Research for Industry" will be led by Dr. J. F. X. Harold and Mr. Frank G. Breyer.

# If Science Speaks

*By* **Walter J. Baëza, F.A.I.C.**

THERE is probably no intelligent person in the United States who is not aware of and perturbed over the economic situation, and none who doubts that its effect is to menace the traditional way of life. It may be that the traditional way has failed; it may be that it has only faltered. It may be that the system under which such progress, materially and socially, as was made during the last century and a half in America, has in it the seeds of its own destruction. Indeed it may be that democracy, and a system of private enterprise with a minimum of restraint, is too slow, cumbersome, and clumsy to accomplish the objectives desired by the sincere proponents of communism, fascism, or democracy.

It is not the purpose of this paper to discuss these questions. Its purpose is to rally scientists to a fuller realization of their responsibility for the civilization they have so largely shaped.

The welfare of a nation is the product of its brains, brawn, and natural resource. All the muscles of the nation working without skill or intelligence upon its resources are powerless to add to the welfare of a single man. The intelligence of the nation concentrated in a single effort can accomplish nothing. Natural resources remain merely potentially useful until acted upon by muscle and brain.

But scientists, whose group intelligence has received the benefit of more education than that of any other group, and who presumably have more skill in the application of brain-power to specific problems, stand aside. They blindly continue their daily tasks though they must be aware these tasks may soon become drained of all creative initiative.

No one contemplating the established fact that eleven million men are, and for a long period have been, without employment in this nation, can fail to be aware that there is something seriously wrong with a system, or the operation of a system, which cannot put them back to work. Those dedicated to parties and causes find it easy to claim, with a volume of vociferous vituperative, that it is because their cause has not had freedom to solve the problem. Utopia, they proclaim, is to be found by following their way. But a scientist has a different idea of Utopia.

He looks at Germany, Italy, Russia, and finds no Utopia under the banners of fascism nor communism.

He looks at the New Deal. In six years it has not put a single man

back to work — eleven million men are out of work now as in the beginning. It has personalized the operation of justice; it has destroyed production and the impetus toward production; it has weakened the incentive toward thrift, and created class warfare in a nation where classes have always been in flux. In spite of its accent on social welfare, national welfare is not increased.

He looks at the Hoover party. It rode the wave of plenty with an almost total disregard for social well-being. It showed an utter incapacity to forsee and provide for the depression. It demonstrated an ostrich-like attitude to it when it reached panic force. It was so fettered by phrases penned more than a century before that it had not the ingenuity nor will to escape the letter of the law to give relief, though not to give it was tacit murder.

He looks at all the world, but nowhere is Utopia.

That the scientist does reach this conclusion is evident whenever a group of them discuss the political picture. For eight years they have been bubbling over with ire against Hoover, against Roosevelt, Hitler, Fascism, Communism. Against, always against. But what are they for? That is something no man would venture to say. They are occasionally for one thing as *against* another, but that is very different from a hearty indorsement of a principle for its own sake.

The utter waste of intelligent effort becomes more evident in any discussion of policy. Though against many, no proposals have been made by scientists to meet the urgent political and economic problems of the day.

Aye, but scientists are not politicians, you say. No. Indeed they are not. No man who can see all sides of a question can be a politician. A fanatical belief that there is but one way, one right, one honor, and that one's own, is the essential equipment of a politician. The ability to view dispassionately and objectively, to compare evidence without prejudice and weigh it impartially, is the prime requisite of a scientist.

No. Scientists are not politicians. But they are citizens. As such they have a duty and an obligation. These are not fullfilled by voting once a year and arguing negatively against the positive policies of current law-makers with a few cronies for the rest of the year. Bankers are not politicians. Businessmen are not politicians. Farmers are not politicians. Yet each of these has a voice that is heard, a voice that helps shape the destiny of the nation. And each of these has a positive policy aiming at the promotion of its group interest.

But the welfare of the nation is a product of labor, natural resources,

and brains. Scientists, with no monopoly on brains, but with no partisanship to color their conclusions; with years of training in objective analysis; with an enviable record in solving physical problems, are silent.

We are still living in a democracy. If it is to survive, it must have the aid of every useful force to make it effective. If it is to change into something else, every useful force must help shape the new system so that it be better than the old. The most powerful force should be the scientific attitude, which up to now has been almost wholly lacking from our statesmanship.

We are still living in a democracy. The voice of labor is heard with respect. It matters not at all if its policy be wise or silly; its voice is heard. The voice of the banker, of the farmer is heard.

The voice of science must be united into tones which will command a hearing. If science has few votes of its own to cast, it can command many. It will be heard by the voter, for it speaks from a background of scientific accomplishment. The voter knows the leadership of the scientist has created the modern world. It has alleviated living conditions, has increased the health and comfort of all, reduced working hours, shortened distance, lengthened life and the daylight hours of life. In fact it has done all that the politicians with their *isms* promise they are going to do. *If it speaks*, the voice of science will vibrate with the authority of achievement, of performance, and will be heard above the noise of promises, though they sound with passion or are wrapped in honey-sweet reasonableness.

If it speaks. Can it speak? There are Democrats, Republicans, Fascists, Communists, and Socialists among scientists. How can these find one voice? Labor, just as fully divided finds one voice. Surely the scientist can bring something of his laboratory attitude, his scientific integrity, his dispassionate passion for truth into the job of being a citizen, a voter, and a welder of public opinion.

Scientists can agree on certain objectives, regardless of past affiliations. They can surely agree that the scientific attitude is greatly needed in state-craft. They may have more difficulty in finding a common means toward their objectives, but labor has united on principles; farmers have done it; bankers have done it. Scientists can surely do it whenever the need is urgent. It has never been more urgent than today.

Science must find a voice.

*Editor's Note*: The author of the above article invites comments and letters from those who may have a program which will make the voice of the scientific attitude audible in government.

# Charles Edward Munroe

1849-1938

Charles Edward Munroe, Honorary Member of the AMERICAN INSTITUTE OF CHEMISTS and Honorary President of the Washington Chapter, passed away peacefully on Wednesday afternoon, December seventh, at his home in Forest Glen, Maryland. He was in his eighty-ninth year. At his bedside when he died were his wife, the former Mary Louise Barker, daughter of the late Professor George Frederick Barker of the University of Pennsylvania, and his five children, Mrs. Dorothy Munroe Rouser, Treadway Barker Munroe, Russell Barker Munroe, Mrs. Winifred Munroe Mathews, and Mrs. Charlotte Munroe Dolph.

Following the services held Friday morning for the Munroe family at the late residence of our beloved honorary member, public services were held in Washington. He was laid to rest among the cypresses and the myrtles of West Laurel Hill Cemetery in Philadelphia.

Dr. Munroe was born at Cambridge, Massachusetts, on May 24, 1849, coming from a long line of sturdy New England ancestors, many of whom rendered important military service during the war of the Revolution. His schooling was obtained first in a private kindergarten and later in the public schools of his native city. On graduation from the Cambridge High School, he matriculated at the Lawrence Scientific School of Harvard University, where he had as his master the foremost

American chemist of his day, Professor Wolcott Gibbs, in whose researches he later served as assistant.

He was graduated from Harvard in 1871, receiving the S. B. degree, *summa cum laude*, and immediately joined the faculty of that institution. Professor Munroe was given full charge of the course in Quantitative Analysis for Seniors, which he carried on independently for three years. He also conducted a course in wet assaying. In 1872-3, he established at Harvard the first course in chemical technology, a forward step which he regarded as one of the most useful acts of his career, and during the summers of 1873 and 1874 he conducted the first established Summer School in Chemistry, probably the first in the world.

In 1874 he was appointed Professor of Chemistry at the United States Naval Academy, holding that chair for twelve years, until in 1886 he was called to the Naval Torpedo Station at Newport, Rhode Island. From 1886 until 1892, he was engaged in chemical activities at the Torpedo Station and the Naval War College. From 1892 to 1917 he was head professor of chemistry at George Washington University; acting from 1892 to 1898 as dean of the Corcoran Scientific School, and from 1893 to 1917 as dean of the School of Graduate Studies, which he originated. Since 1917, he was dean emeritus of the School of Graduate Studies and professor emeritus of chemistry at George Washington University. He received from George Washington University the degrees of Ph.D. and LL.D.

Dr. Munroe often expressed the thought that chemists and other scientists should contribute also to public service and civic affairs and in both of these he was very active. Entrusted by our Government with the investigation of many technical problems, he carried on distinguished and effective work that was recognized, not only in the Executive Departments and Independent Establishments of the Government but throughout the world.

It was during Professor Munroe's public service at the Naval Torpedo Station at Newport that he invented smokeless powder, to the envy—if not consternation—of foreign powers whose foremost chemists had been seeking the formula for years. Official records in the archives of the Navy recite the history of his investigations and of the successful work performed at the torpedo station. President Benjamin Harrison, in his annual message to the Senate and House of Representatives, December 6, 1892, called attention to this development as one of the most noteworthy achievements of his administration.

Another remarkable discovery made by him while stationed at Newport was a principle of detonation. This discovery—known as the *Munroe effect*—throws a light on the nature of the detonation wave and may well be the key to airplane bombing. The results of some of Professor Munroe's experimental work with his effect are seen in the form of beautiful impressions of leaves, laces, etc., made upon squares of armor-plate, fashioned into a unique fire-screen and presented by him to the Cosmos Club.

Among his other inventions may be mentioned his porous cone, his metallic felt filters, his invention of a method for the production of a porcelain biscuit of uniformly fine porosity applied by him to refrigeration without ice. He often appeared as an expert in patent and other technical litigation. He was for long the chairman of the Committee on Patents of the American Chemical Society.

Since its inception, Dr. Munroe was connected with the National Research Council as chairman of the Committee on Explosives Investigations, conducting in this capacity much valuable work, among which may be mentioned that on ammonium nitrate. He was also chief explosives chemist of the United States Bureau of Mines from 1910 to 1933 and was one of its active organizers. He was a member of the Board of Visitors of the United States Naval Academy, consultant on the engineering board which planned the defense of Washington during the Spanish-American War, and chairman of the Committee on Explosives for the American Society for Testing Materials. In addition to these duties he was prominently engaged in consulting work for the Assay Commission, the Civil Service Commission, the Geological Survey, the American Railway Association, and as consulting expert on explosives to the War and Navy Departments. Since 1934, he acted as explosives consultant to the Forest Service and for many years he was retained in a similar capacity by at least ten governments.

Of Dr. Munroe's many contributions to his favorite study of chemistry, it cannot but be felt that his great work on *Chemical Technology* prepared for the Bureau of the Census is by far the most important. Considering it along with the younger Silliman's contribution to American chemistry, presented at the Northumberland celebration of the centenary of the discovery of oxygen in 1874, it would be possible to write the history of American chemistry. In *Bulletin 92 of the Census of 1905* he pointed out the close relationship of invention to manufacture, and the importance, in arriving at any true estimate of the growth of manufacture, of correlating patents with the data of production. He

was the first to point out this relation and to demonstrate it. In subsequent Census publications, Dr. Munroe summarized the patents issued in connection with each of the arts, so that his lists are complete summaries from the founding of the Patent Office up to the date each Bulletin was written. He thus summarized many thousand patents in the chemical industry.

Foreign governments and scientific societies conferred many honors upon Dr. Munroe. In 1888, he was elected a Fellow of the Chemical Society of London. In 1901, he was decorated Commandant of the Order of the Medjidji by the Sultan of Turkey, and in 1920, Belgium conferred upon him the decoration of Officer of the Order of Leopold. The Swedish Academy of Sciences appointed him in 1900 to nominate the candidate for the Nobel prize in chemistry. He was a member of the English and German Chemical Societies and was a member of four International Congresses of Applied Sciences and of the Second Pan-American Scientific Congress. He belonged to the Boston City Club, the National Arts Club of New York City, the Chevy Chase Club, and he enjoyed the distinction of having served twice as president of the Cosmos Club.

In addition to the direct educational work undertaken and carried out by him, he maintained an active interest in organizations which have to do with the diffusion of knowledge. He devoted himself to this interest particularly in its application to the science of chemistry and also in its relationship to the chemist as a human being. He was elected a member of the American Association for the Advancement of Science at its Portland meeting in 1873, and participated in the organization of the subsection on chemistry, of which, in 1880, he was chosen secretary. In 1874 he was advanced to the grade of Fellow, and in 1888 presided over the section with the rank of vice-president of the Association. He was a charter member of the American Chemical Society, and in 1898 its President. He was the last surviving charter member of the Society. Mainly through his indefatigable efforts and wise leadership, the Society was raised from the status of a parochial organization to that of a national society. This period marked the turning point in its existence, and since then its growth and influence has been most remarkable. He was a founder member and the organizing chairman of the Rhode Island Section, the first section formed.

Dr. Munroe early recognized the principles for which The American Institute of Chemists stands. Always interested, of course, in chemistry and the work of chemists, he yet took time from his busy, active

life to think of chemists as human beings, to express that thought in terms of encouragement and helpfulness to them, and to translate it into an active personal participation in solving some of the problems of his fellow-chemists. He was elected in 1924 to Honorary Membership in THE AMERICAN INSTITUTE OF CHEMISTS. In formally accepting the office of Honorary President of the Washington Chapter he wrote the secretary of the Chapter in part as follows:

> "I take pleasure in accepting this distinction and ask you to convey to the officers and members of the Chapter my great appreciation of their action and to assure them of my complete sympathy with the purposes and aspirations of this organization."

Among other organizations in which he held membership are the American Academy of Arts and Science, American Philosophical Society, and the Washington Academy of Sciences.

During more than half a century of teaching chemistry, Professor Munroe's activities were not confined to the university lecture room, for he contributed, under the auspices of scientific and educational institutions, to the furtherance of the knowledge of chemistry among the people through his numerous public lectures. A master in expression and interpretation of fact, his numerous scientific papers, books and monographs are a part of the enduring records of the history of science.

Although actively and constantly engaged during his career in a variety of pursuits of a highly technical nature, and while many and manifold were his duties, it is primarily as a teacher and friend that one thinks of him. His remarkable power of presentation made him an inspiration in the classroom. Of a gentle and unassuming nature, possessed of a most engaging personality, he had an unusual capacity for making friends. At his home in Forest Glen, he welcomed them most hospitably and they were delighted to be privileged to visit with him. Until within recent months his friends made Forest Glen a Mecca at various and sundry times. This was especially true of his birthday anniversaries when he received many congratulations and felicitations. "Birthdays record our growth in grace, not age," and Dr. Munroe grew dearer and dearer to his friends with the passage of the years.

We rejoice that such a man lived and worked and moved among us for so long a time and though the touch of his hand is still and the sound of his voice is gone, he lives on in our hearts.

# Allen Rogers

On Friday, November 4, 1938, we lost through death one of the most respected as well as one of the most productive men in American chemistry, Dr. Allen Rogers.

Dr. Rogers was born in Hampton Highlands, Maine, sixty-two years ago. He did his undergraduate work at the University of Maine, from which college he was graduated with the degree of Bachelor of Science in Chemistry in 1897. Following graduation he was retained by his alma mater as an instructor in chemistry and three years later was awarded the degree of Master of Science. His graduate study was continued at the University of Pennsylvania, where he specialized and did his major research in the field of organic chemistry. He was awarded the degree of Doctor of Philosophy by this institution in June, 1902, and was at once invited to remain as a member of its teaching staff.

Dr. Rogers left the University of Pennsylvania to enter chemical industry. While employed as a research chemist with the Oakes Manufacturing Company of Long Island City, he became interested in the field of leather chemistry, an interest which he maintained until his death.

In 1905, he was invited to accept a position as instructor in the department of industrial chemistry at Pratt Institute, Brooklyn. His success as a teacher and research worker was immediate and profound. He was named head of the department of chemical engineering in 1920, a position which he still held "Emeritus" at the time of his death.

Coincident with his work at Pratt Institute, he served as consulting engineer to many industrial organizations in and about New York City. During the World War, he acted as major in the Chemical Warfare Service while still continuing his heavy teaching responsibilities.

Dr. Rogers was awarded several patents as a result of work done on tanning processes and the manufacture of surgical sutures. He was a prolific writer of technical and scientific texts and articles dealing mainly with leather, furs, soaps, paints, and sutures.

His textbook on *Industrial Chemistry* is widely used both as a reference book in manufacturing plants and as a textbook in universities.

One of Dr. Rogers' finest recognitions came in 1920 when he was awarded the Grasselli Medal for his outstanding work on the tanning of shark skins. It was through his efforts primarily that shark skin was made available for commercial use.

Dr. Rogers was a member of many societies, including The Chemists' Club, Phi Gamma Delta, and Sigma Xi. He was important in the activi-

ties of the American Chemical Society, the Society of Chemical Industry, the American Institute of Chemical Engineering, THE AMERICAN INSTITUTE OF CHEMISTS, the American Society for Testing Materials, the American Leather Chemists' Association, and the Society for the Promotion of Engineering Education.

Merely to enumerate the activities and achievements of Dr. Rogers would in no way adequately portray his place in American chemistry and in the field of chemical education. He was a man who was appreciated and loved by every group with which he came in contact. Few men of our time have possessed finer personalities. He was friendly, cordial, warmly sympathetic, filled with good humor, and eager always to extend a helping hand to anyone worthy of such assistance.

Dr. Rogers the chemist, teacher, and research worker, will no longer be among us, but his influence and personality will continue on, growing in force and influence and thus perpetuating the memory of a man whom we shall always think of as a gentleman of culture and accomplishment.

## THE WINTER SOLSTICE
### A Pagan Paean
*By* **Jerome Alexander, F.A.I.C.**

World-brightening Persephone is gone,
Ravished by Dis to Stygian realms below;
The Hamadryads with Demeter mourn,
Wailing to heartless Boreas their woe.

Trembling with cold, abject in desolation,
Low in the fields the sere sheaves huddling lie;
The leafless trees, in silent supplication,
Raise their bare arms to an unheeding sky.

And bright-eyed Phoebus shuns the cheerless scene,
Turning his car to the horizon's verge,
Toward happy Ethiopia, evergreen,
Beyond the earth-encircling Ocean's surge.

All-mighty Zeus! Can'st Thou yet heed our prayer,
When pleads a Mother-Goddess' love with Thee?
Hear, we implore, the voice of our despair,
And to the pallid world restore Persephone!

Rejoice! For Phoebus, turning to dispel
The deepening darkness with reviving rays,
Leads fair Persephone from the gloom of Hell.
Eternal praise to Zeus! Eternal praise!

# COUNCIL

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### December Meeting

The one hundred and fifty-seventh meeting of the Council of THE AMERICAN INSTITUTE OF CHEMISTS was held at The Chemists' Club, 52 East 41st Street, New York, N. Y., on December 13, 1938, at six o'clock p. m.

President Robert J. Moore presided. The following officers and councilors were present: Messrs. R. A. Baker, F. G. Breyer, B. H. Knight, R. J. Moore, H. S. Neiman, W. T. Read, G. E. Seil, N. A. Shepard, M. Toch, and W. D. Turner. Mr. M. R. Bhagwat and Miss V. F. Kimball were present.

The minutes of the previous meeting were approved.

The Treasurer's report, showing a bank balance as of November 30, 1938, of $3037.16, and bills payable of $373.95, was read and accepted.

Several names were suggested as possible contributors to THE CHEMIST and the Editor was asked to write them and request their coöperation.

The following Committee on Honorary Members was appointed by the President: Maximilian Toch, Chairman; M. L. Crossley, Henry G. Knight, Marston T. Bogert.

The following Committee on National Legislation Affecting Chemists was appointed: Henry A. Gardner, Chairman; Henry C. Fuller.

The following Committee on Patents was appointed: Gilbert E. Seil, Chairman; Jacque C. Morrell, Charles W. Rivise, William M. Grosvenor, Maximilian Toch, Frank G. Breyer, Archie J. Weith.

After discussion, it was decided to appoint a committee to get prominent members of the INSTITUTE to coöperate with the Chemist Advisory Council and to encourage them to disseminate information about the Council with the purpose of obtaining contributions and

sending unemployed chemists to register. Accordingly, the following Contact Committee for the Chemist Advisory Council was appointed: Ross A. Baker, Chairman; W. W. Winship, W. T. Read.

The vacancy on the Council caused by the death of Dr. Allen Rogers was filled by the appointment of Dr. Harry L. Fisher to fill the unexpired term until May 1, 1939.

Upon motion made and seconded, Dr. Gerald Wendt's invitation that THE AMERICAN INSTITUTE OF CHEMISTS hold a luncheon meeting on a Saturday, followed by a guided tour of the grounds of the World's Fair, shortly after April 30, 1939, was accepted.

After discussion of a resolution by the Niagara Chapter that the INSTITUTE's Chapters be defined by State lines to facilitate the licensing movement, the following motion was passed: Moved and seconded that the INSTITUTE's Chapters maintain their boundaries along state lines.

The Secretary read a letter from J. W. E. Harrisson, Chairman of the Committee on Licensing, which reported that a meeting of that committee had been held, and that another meeting to formulate a proposed bill for licensing in New York State would be called during the week of December nineteenth, if authorized by the Council.

Upon motion made and seconded, the following resolution was adopted:

RESOLVED: That the Council of THE AMERICAN INSTITUTE OF CHEMISTS, recognizing the responsibility of the chemist in fostering the welfare, health, and happiness of their fellow citizens as well as the chemists' necessary service in advancing the industrial and agricultural welfare of the nation, recommends that active steps be taken to adopt a means of licensure.

The Council therefore, instructs the Committee on Legislation to draft a proposed uniform act to regulate the practice of chemistry in any of its branches.

The Committee on Legislation was requested to furnish each member of the Council with a copy of this proposed act to regulate the practice of chemistry.

After discussion, the following resolution was passed:

RESOLVED: That any chemist who is a member of THE AMERICAN INSTITUTE OF CHEMISTS and employed in a professional capacity is exempt from the Fair Labor Standards Act of 1938 (Wages and Hours Act).

The following new members were elected:

FELLOWS

**Adams, Clyde S.**
(1938), *Chairman*, Chemistry Department, Antioch College, Yellow Springs, Ohio

**Albright, Penrose S.**
(1938), *Assistant Professor*, Southwestern College, Winfield, Kans.

**Baughman, Imo P.**
(1938), *Instructor*, Los Angeles Junior College, Los Angeles, Calif.

**Bodé, Donald D.**
(1938), *Professor of Chemistry*, University of Tampa, Tampa, Florida.

**Branting, Briant F.**
(1938,) *Research Chemist*, Nitrogen Division, Solvay Process Company, Hopewell, Va.

**Bridgewater, Ernest R.**
(1938), *Division Manager*, Organic Chemicals Department, E. I. du Pont de Nemours and Company, Wilmington, Delaware.

**Callan, William**
(1938), *President*, Casein Company of America, Division of the Borden Company, 350 Madison Avenue, New York, N. Y.

**Coe, Mayne R.**
(1938), *Associate Chemist*, Bureau of Chemistry and Soils, Department of Agriculture, Washington, D. C.

**Fraps, George S.**
(1938), *Chief*, Division of Chemistry, Agricultural and Mechanical College of Texas, College Station, Tex.

**Freas, Raymond**
(1938), *Professor of Organic Chemistry*, Tulane University of Louisiana, New Orleans, La.

**Garnatz, George F.**
(1938), *Chief of Staff*, Laboratories Division, The Kroger Food Foundation, 125 Government Square, Cincinnati, Ohio.

**Gray, Daniel M.**
(1938), *Assistant Superintendent*, Hazel-Atlas Glass Company, Wheeling, West Virginia.

**Gutzeit, C. L.**
(1938), 4606 Park Drive, Houston, Texas.

**Howard, John J.**
(1938), *Vice-president*, E. J. Lavino and Company, 1528 Walnut Street, Philadelphia, Penna.

**Hughes, William J.**
(1938), *Assistant Chemist*, New York Sugar Trade Laboratory, 113 Pearl Street, New York, N. Y.

**Jordan, Walter E.**
(1938), *Associate Professor of Chemistry*, North Carolina State College, Raleigh, N. C.

**MacGee, A. Ernest**
(1938), *Manager*, Solvents Sales, Skelly Oil Company, 4814 South Richmond Street, Chicago, Ill.

**McCracken, Roy**
(1938), *Chief Chemist*, du Pont Rayon Company, Waynesboro, Va.

**McGraw, John, Jr.**
(1938), *Head*, Department of Chemistry, Concord State Teachers' College, Athens, W. Va.

**Moore, Howard R.**
(1938), *Paint Technologist*, United States Navy Yard, Test Laboratories, Philadelphia, Penna.

**Richer, Archibald S.**
(1938), *Chemist*, Molnar Laboratories, 211 East 19th Street, New York, New York.

**Seaton, Max Y.**
(1938), *Technical Director*, Westvaco Chlorine Products Corporation, 405 Lexington Avenue, New York, N. Y.

**Seil, Harvey A.**
(1938), *President*, Seil, Putt, and Rusby, Inc., 16 East 34th Street, New York, N. Y.

**Shingler, G. P.**
(1938), *Senior Chemist*, Naval Stores Station, U. S. Department of Agriculture, Bureau of Chemistry and Soils, Olustee, Florida.

**Todd, Leslie Jay**
(1938), *Head*, Department of Chemistry, Marshall College, Huntington, West Virginia.

**Walker, John C.**
(1938), Cities Service Oil Company, Bartlesville, Oklahoma.

**Weaver, Christian**
(1938), *Dean*, School of Brewing Technology, National Brewers' Academy, 315 Fourth Avenue, New York, New York.

**Williams, Leon Frank**
(1938), *Professor of Organic Chemistry*, North Carolina State College, Raleigh, N. C.

**Whiteford, G. H.**
(1938), *Head*, Department of Chemistry, Colorado State College of Agriculture, Fort Collins, Colo.

ASSOCIATES

**Blume, Matthew C.**
(A.1938), *Chief Research Chemist*, Rufert Chemical Division, Seymour Manufacturing Company, Seymour, Connecticut.

**Jones, Rufus Vernon**
(A.1938), *Assistant Professor*, East Texas State Teachers College, Commerce, Tex.

**Whitney, William B.**
(A.1938), *Associate Professor of Chemistry*, Department of Chemistry, North Texas Agricultural College, Arlington, Tex.

JUNIORS

**Kelley, Maurice J.**
(J.1938), *Chemist*, National Oil Products Company, Inc., First and Essex Streets, Harrison, N. J.

**Kennedy, James J., Jr.**
(J.1938), 2328 E. Allegheny Avenue, Philadelphia, Penna.

**Mahlman, John J.**
(J.1938) *Junior Chemist*, Stein-Davies Company, 11-35 48th Avenue, Long Island City, N. Y.

**Neuss, William H. E.**
(J.1938) *Chemist*, Stein-Davies Company, 11-35 48th Avenue, Long Island City, N. Y.

The application of David Hart for reinstatement as a fellow was granted.

The application of Charles Vine Collier to be raised from Associate to Fellow was granted.

Upon motion made and seconded, it was decided that the Council would furnish student medals free of charge to the Chapters.

The Secretary reported that the membership now numbers 1401.

Dr. Read reported for the Committee on Membership.

Upon motion made and seconded, a vote of thanks was given to the Membership Committee for its accomplishments.

There being no further business, adjournment was taken.

# CHAPTERS

## New York

*Chairman*, Frederick Kenney *Vice-chairman*, Frederick W. Zerban

*Secretary-treasurer*, D. H. Jackson
17 John Street
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# THE SCIENCE ANGLER

**Kenneth E. Shull, J.A.I.C.**

By making analyses of various parts of the body and correlating the results it is possible for the chemist to determine an individual's age. Thus an excess of calcium, sodium or chlorine in the muscles and organs indicates old age, whereas the elements potassium, magnesium, phosphorus, and nitrogen are characteristic of youth.

Were it not for the fact that these determinations can only be made on persons after death, women, with their natural aversion to figures of age, would probably look with disdain upon the profession of chemistry.

One of the most recent "methods" of analytical chemistry involves the use of the ultra-violet light. Fundamentally the process depends upon the fact that many substances emit a characteristic fluorescence. The use of more complicated equipment enables the amount of the material present to be estimated. Thus far applications have been found principally in the field of fertilizers. By this method it is possible to identify and control the quality of a fertilizer as well as determine the uniformity with which it is distributed over a particular area.

It is generally believed that about three quarters of the world's population are users of soap. Assuming that the 10,000,000,000 pounds manufactured annually are equally distributed among 1,500,000,000 people, the per capita consumption would be 6.6 pounds. This would amount to nearly a third of an ounce per day per person.

So the civilized world is, after all, a pretty clean place in which to live.

The adage, "seeing is believing", has been accepted by the scientist throughout the years of his existence. Thus he has endeavored at all times to develop apparati, intricate and powerful, that he might better see what makes this old world tick.

Along this line, there has recently been developed a super microscope which is capable of magnifying as high as 20,000 times. Although this instrument does not permit one to watch the course of the dancing electrons, it does open up for the first time to the human eye the realm of colloidal dimensions.

The famous song writer who penned "Smoke Gets in Your Eyes" might have added that 0.0031 ounces of smoke gets in your eyes. That, according to *Science News Letter*, is the weight of visible smoke obtained from the burning of one cigarette.

It is certainly a truism that the United States is the largest producer of iron and steel. Although much of this versatile product is exported to foreign countries, a goodly quantity is reserved to help turn our own wheels of industry.

Recent estimates made by the American Iron and Steel Institute show that the average American housewife owns and uses about 600 pounds of steel, exclusive of furnaces, automobiles and plumbing.

This figure becomes more tangible when one examines the materials of construction of stoves, washing machines, alarm clocks, eating utensils, bed springs, and—lest we forget—the hairpin, whose secondary function is to add weight to a somewhat "lighter" head covering.

Moses struck a rock and water gushed forth; Mohr passed sunlight into water and produced fire. Although the former miracle took place in Biblical days, the latter is a direct result of the modern scientist's ingenuity.

In Mohr's method the action of sunlight on a thermocouple produces an electric current. This in turn is used to decompose water, and the resulting hydrogen is ignited.

Henry G. Knight, F.A.I.C., chief of the Bureau of Chemistry and Soils, U. S. Department of Agriculture, spoke at a meeting of the New York University Chapter of Sigma Xi, held in New York on November 17, 1938. His subject was "The Rôle of Minor Elements in Agriculture."

# BOOKS

UNTERSUCHUNG UND NACHWEIS VON 125 IN PHARMAZEUTISCHEN GEHEIMMITTELN UND SPEZIALITÄTEN VERWENDETEN STOFFEN by C. A. Rojahn and K. E. Beyerle, 1937, 149 pp. Price: RM. 3.45.

ANALYSENGANG ZUR ERKENNUNG DER PHARMAZEUTISCH VERWENDETEN FULLSTÖFFE, GERUCHSUND-GESCHMACKSKORRIGENTIEN, FERNER PHARMAZEUTISCHER UND TECHNISCHER LÖSUNGSMITTEL, by C. A. Rojahn and F. W. v. Brocke, 1938, 254 pp. Price: RM. 4.50. *Akademischer Verlag*, Halle a.S., Germany.

These two booklets, issues eight and nine of Professor Rojahn's *Procedures in Pharmaceutical Analysis*, contain many old and new analytical methods of interest to chemists employed with investigations of pharmaceuticals. Since these methods are adapted to the requirements of the German pharmacopoeia, it is doubtful that they could be of great value to many Americans, but they may be interesting to a few research-workers.

—Rudolf Seiden, C.E.

GRUNDRISS DER PHARMAKOLOGIE, TOXIKOLOGIE UND ARZNEIVERORDNUNGELEHRE, by Heinrich Gebhardt. 9th edition, 1938, 386 pp., *R. Müller & Steinicke, Munich.* Export price: RM. 3.30.

In concentrated form, this book gives a review of present day knowledge in the fields of pharmacology, toxicology and prescription writing. Chemists, working in the medical, pharmaceutical or physiological fields, should be interested in this excellent book. It seems to me a worthwhile undertaking, if an American publisher would give us a similar book or a translation of the German book, with perhaps a few adjustments in several of the prescriptions to make them comply with the American Pure Food and Drug Act, where it may differ from the German law.

—Rudolf Seiden, C.E.

The next issue of THE CHEMIST will contain the membership list of THE AMERICAN INSTITUTE OF CHEMISTS.

# NORTHERN LIGHTS

**By Howard W. Post, F.A.I.C.**

"To see oursel's . . . " was our privilege lately in reading an article in a recent issue of *Canadian Chemistry and Process Industries.* The article commented on two distinct trends in American professional-chemical affairs. The first was our interaction with and on the medical profession, and the second was the possibility that technically trained individuals might see their jobs more in the light of jobs as such than positions in a professional group.

The paper goes on to say that there is a very real temptation to do something, at times, about economic injustices, whether in line of salary or otherwise and will probably be the first to feel the full force of this temptation. We rather liked its tribute to a sister organization, the American Chemical

Society, as having "done more than any other organization" in standing for the rights of chemists, as such, against the medical profession or some of its members, backed as they are by the law of the land. We might add that the writer of this article must have some friends in Pennsylvania! The writer says, however, that in so far as organization is concerned, the college-trained professional man naturally turns to the institutes to maintain professional standards and to lead in organized enterprises.

At a recent meeting of the Toronto Branch of the Canadian Institute of Chemistry, open discussion was held on the general subjects of training, ethics, and business. Among other suggestions which were passed on for consideration by the profession, was that of an added year to the curriculum of chemical engineering to be devoted to more specific matters than are generally to be found in the ordinary undergraduate program. Another speaker deplored the tendency, at times, to make chemists responsible for "the ethics of business." That, of course, is an extremely controversial subject and, to our way of thinking, could easily have been the chief topic of discussion for the entire evening, if circumstances had permitted.

# EMPLOYMENT

## Chemists Available

BIOCHEMIST, PH.D., M.D., F.A.I.C. American citizen. 20 years' research experience (Germany, U. S. A., South America). Affiliated with South American leading society. Valuable connections in South American government circles. Languages. Thorough knowledge of South American markets and expansion possibilities of United States interests. Country most familiar with: Chile. (Argentina.) Seeks position with American firm here or in South American country. Please reply to Box 121, THE CHEMIST.

INDUSTRIAL CHEMIST, F.A.I.C., Harvard Graduate; age 36. Ten years' plant and laboratory experience. Pulp, paper, paper board mills; cellulose plastics; mineral pigments; dyes; starches, resins and waxes. Available immediately. Please reply to Box 103, THE CHEMIST.

CHEMICAL ENGINEER, F.A.I.C., Age 33. Wants to organize and operate a trouble-shooting and operations development department in a medium-sized manufacturing plant. Varied experience with Bureau of Standards, Du Pont, and others qualified me for this work in many fields. Please reply to Box 111, THE CHEMIST.

ORGANIC CHEMIST, F.A.I.C., Ph.D. in synthetic organic chemistry; age 27, single. Experienced in organic synthesis, has designed and supervised work in microchemical laboratory; year industrial research experience (thiourea resins); third year assistant instructor in eastern university; seeking industrial research position. Publication; member Sigma Xi, Phi Lambda Upsilon; location immaterial, available at short notice. Please reply to Box 105, THE CHEMIST.

SENIOR RESEARCH CHEMIST, F.A.I.C., wishes position. A.B. and Ch.E. degrees. Age 37. Thirteen years' experience in asphalt, non-ferrous metals, and all phases of petroleum refining and research. Please reply to Box 99, THE CHEMIST.

INDUSTRIAL CHEMIST. Position wanted by F.A.I.C. Twenty-two years' experience in industrial research and plant operation; individual work and supervision. Specialties: dyes, pharmaceuticals, intermediates, vitamins, both water and oil soluble. Plant design and construction. Ph.D. from leading American University. Member American Institute of Chemical Engineers. Organic and biological chemistry. Please reply to Box 95, THE CHEMIST.

CHEMIST, M.S. degree, age 37, desires position in laboratory or classroom. Experienced in both analytical work and teaching. Steel, rubber, heavy chemicals. As teacher would prefer small junior college. Please reply to Box 93, THE CHEMIST.

CHEMIST-BACTERIOLOGIST, A. A. I. C. Analytical, research development. Pulp, paper and by-products; distilled alcoholic beverages; dairy products; brewery; soap, pharmaceuticals, and cosmetics; general food investigations. Please reply to Box 101, THE CHEMIST.

## Positions Offered

Chemist experienced in the analysis of heavy chemicals. Salary $1900.

Chemist experienced in textiles. Pyroxylin. Salary $1800 up.

2 chemists experienced in synthetic resins.

Chemist with experience in the breakfast cereal field.

For these positions, please reply to Box 122, THE CHEMIST.

Leo H. Baekeland, Honorary Member of THE AMERICAN INSTITUTE OF CHEMISTS, received Honorary Membership in The Chemists' Club, New York, at a dinner given on December second. William Callan, F.A.I.C., president of The Chemists' Club, introduced the speakers. Important among them were Dr. Clothier, president of Rutgers University, and Maximilian Toch, F.A.I.C., who spoke on the human aspects of Dr. Baekeland's career, from his first struggles until his success. In reply, Dr. Baekeland paid tribute to his happy associations and valued friendships within The Chemists' Club.

Leon F. Shackell, F.A.I.C., since 1930 a member of the research staff of E. R. Squibb and Sons, has joined the Chicago patent law firm of Williams, Bradbury, McCaleb and Hinkle.

E. F. Marsiglio, F.A.I.C., formerly editor of *The Chemist-Analyst*, published by J. T. Baker Chemical Company, is now a member of the New Products Division of Merck and Company, Inc., Rahway, New Jersey.